DiGi Electronics

PBHV8550XF Datasheet

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DiGi Electronics Part Number	PBHV8550XF-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	PBHV8550XF
Description	TRANS NPN 500V 0.15A SOT89
Detailed Description	Bipolar (BJT) Transistor NPN 500 V 150 mA 35MHz 520 mW Surface Mount SOT-89

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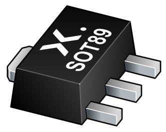
Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
PBHV8550XF	Nexperia USA Inc.
Series:	Product Status:
-	Active
Transistor Type:	Current - Collector (Ic) (Max):
NPN	150 mA
Voltage - Collector Emitter Breakdown (Max):	Vce Saturation (Max) @ Ib, Ic:
500 V	90mV @ 6mA, 50mA
Current - Collector Cutoff (Max):	DC Current Gain (hFE) (Min) @ Ic, Vce:
100nA	50 @ 50mA, 10V
Power - Max:	Frequency - Transition:
520 mW	35MHz
Operating Temperature:	Grade:
150°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Package / Case:	Supplier Device Package:
TO-243AA	SOT-89
Base Product Number:	
PBHV8550	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.21.0095	



PBHV8550X

500 V, 150 mA NPN high-voltage low VCEsat (BISS) transistor

9 October 2024 Product data sheet

1. General description

NPN high-voltage low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a medium power SOT89 (SC-62) flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- AEC-Q101 qualified

3. Applications

- Electronic ballasts
- LED driver for LED chain module
- LCD backlighting
- Automotive motor management
- Flyback converters
- Switch Mode Power Supply (SMPS)

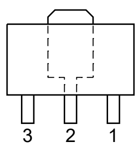
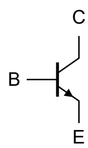
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	500	V
I_C	collector current			-	-	150	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 30 mA; T_{amb} = 25 °C		50	100	-	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter	 SOT89	 sym123
2	C	collector		
3	B	base		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBHV8550X	SOT89	plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body	SOT89

7. Marking

Table 4. Marking codes

Type number	Marking code
PBHV8550X	C8

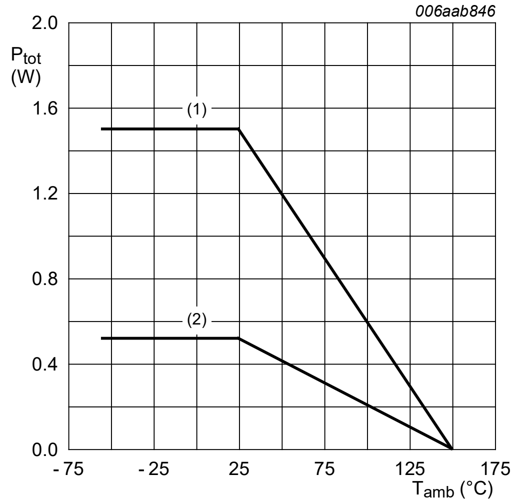
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	500	V
V_{CEO}	collector-emitter voltage	open base		-	500	V
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V		-	500	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	150	mA
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	0.5	A
I_{BM}	peak base current			-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	520	mW
			[2]	-	1.5	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 6 cm^2.



(1) FR4 PCB, mounting pad for collector 6 cm^2
(2) FR4 PCB, standard footprint

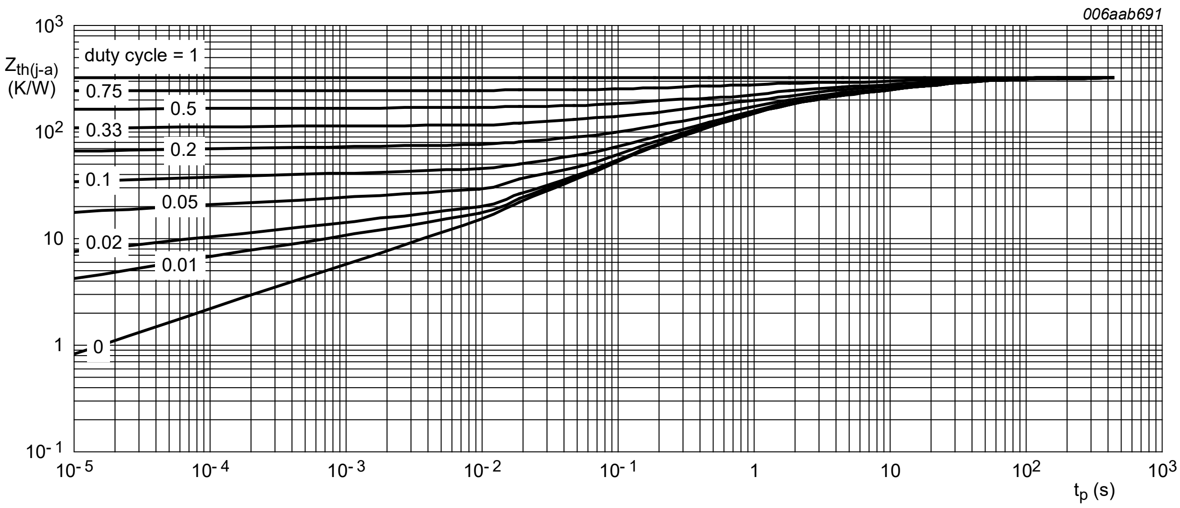
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	241	K/W
			[2]	-	-	84	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	20	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 6 cm^2.



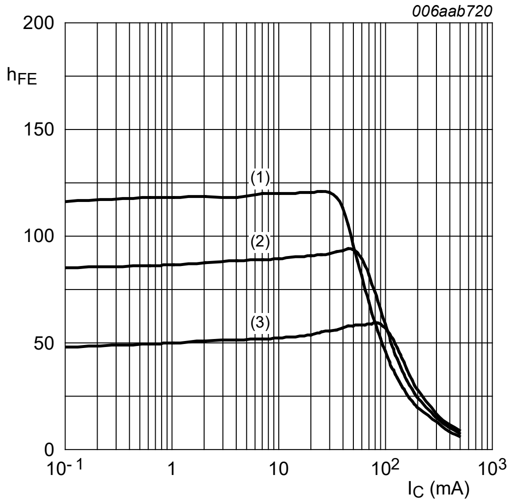
FR4 PCB, standard footprint

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

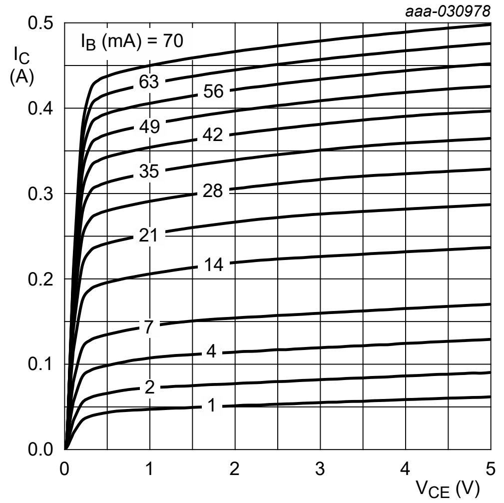
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A; T_{amb} = 25 °C		500	-	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage (base shorted)	I_C = 2.5 mA; V_{BE} = 0 V; T_{amb} = 25 °C		500	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 100 µA; I_C = 0 A; T_{amb} = 25 °C		6	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = 360 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 360 V; I_E = 0 A; T_j = 150 °C		-	-	50	µA
I_{CES}	collector-emitter cut-off current	V_{CE} = 360 V; V_{BE} = 0 V; T_{amb} = 25 °C		-	-	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 30 mA; T_{amb} = 25 °C		50	100	-	
		V_{CE} = 10 V; I_C = 50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		50	100	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 20 mA; I_B = 2 mA; T_{amb} = 25 °C		-	60	75	mV
		I_C = 50 mA; I_B = 6 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	65	90	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 50 mA; I_B = 5 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	0.75	0.9	V
t_d	delay time	V_{CC} = 20 V; I_C = 0.05 A; I_{Bon} = 5 mA; I_{Boff} = -5 mA; T_{amb} = 25 °C		-	80	-	ns
t_r	rise time			-	2700	-	ns
t_{on}	turn-on time			-	2780	-	ns
t_s	storage time			-	3400	-	ns
t_f	fall time			-	800	-	ns
t_{off}	turn-off time			-	4200	-	ns
f_T	transition frequency	V_{CE} = 10 V; I_C = 10 mA; f = 100 MHz; T_{amb} = 25 °C		-	35	-	MHz
C_c	collector capacitance	V_{CB} = 20 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	4	-	pF
C_e	emitter capacitance	V_{EB} = 0.5 V; I_C = 0 A; i_c = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	200	-	pF



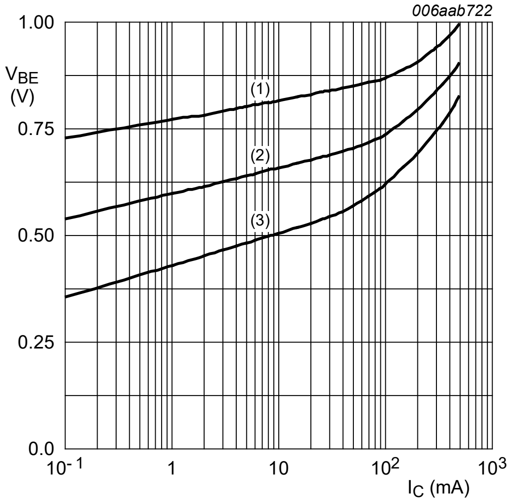
V_{CE} = 10 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 3. DC current gain as a function of collector current; typical values



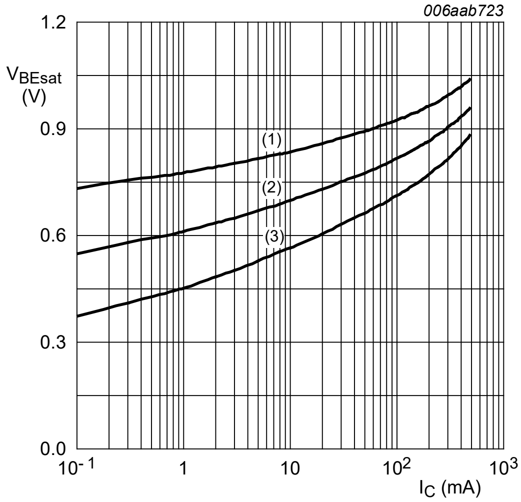
T_{amb} = 25 °C

Fig. 4. Collector current as a function of collector-emitter voltage; typical values



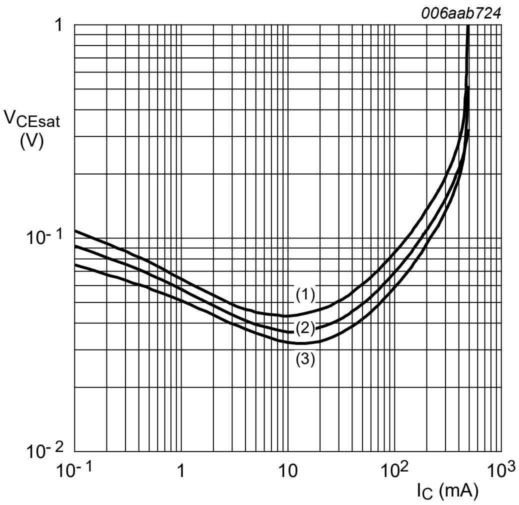
V_{CE} = 10 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 5. Base-emitter voltage as a function of collector current; typical values



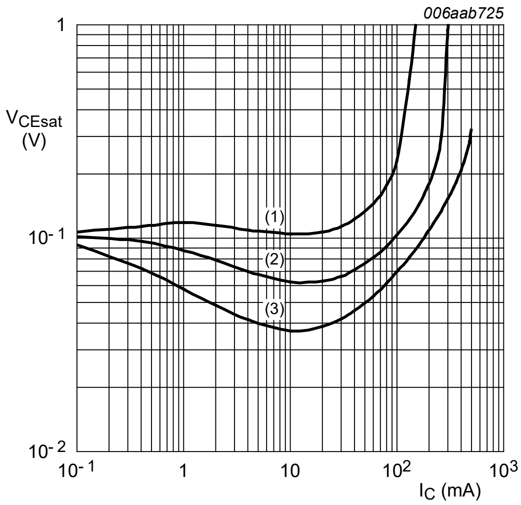
I_C/I_B = 5
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values



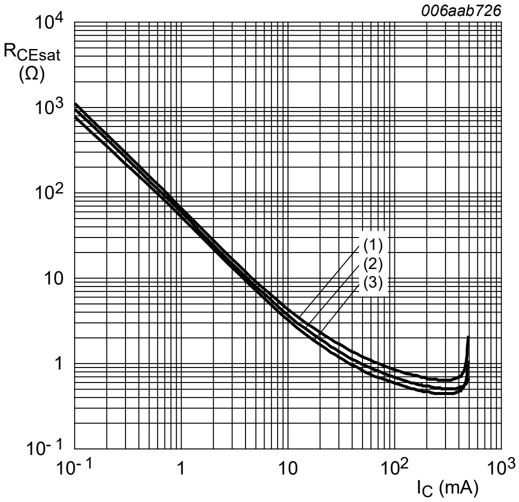
$I_C/I_B = 5$
(1) $T_{amb} = 100\ °C$
(2) $T_{amb} = 25\ °C$
(3) $T_{amb} = -55\ °C$

Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values



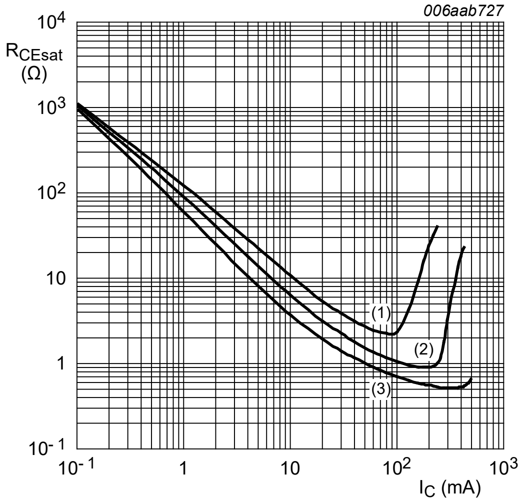
$T_{amb} = 25\ °C$
(1) $I_C/I_B = 20$
(2) $I_C/I_B = 10$
(3) $I_C/I_B = 5$

Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 5$
(1) $T_{amb} = 100\ °C$
(2) $T_{amb} = 25\ °C$
(3) $T_{amb} = -55\ °C$

Fig. 9. Collector-emitter saturation resistance as a function of collector current; typical values



$T_{amb} = 25\ °C$
(1) $I_C/I_B = 20$
(2) $I_C/I_B = 10$
(3) $I_C/I_B = 5$

Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

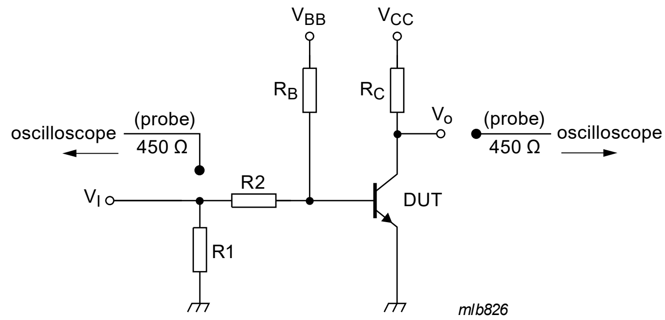


Fig. 11. Test circuit for switching times

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

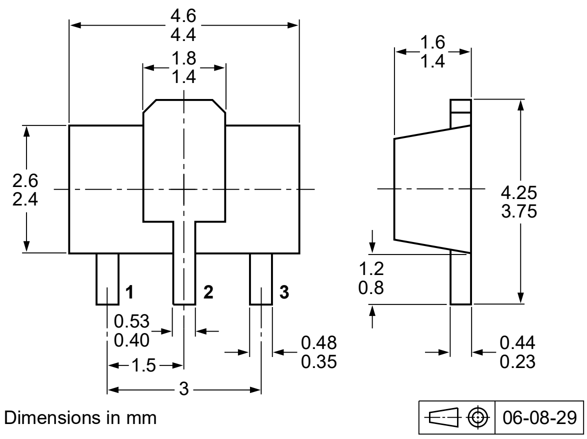


Fig. 12. Package outline SOT89

13. Soldering

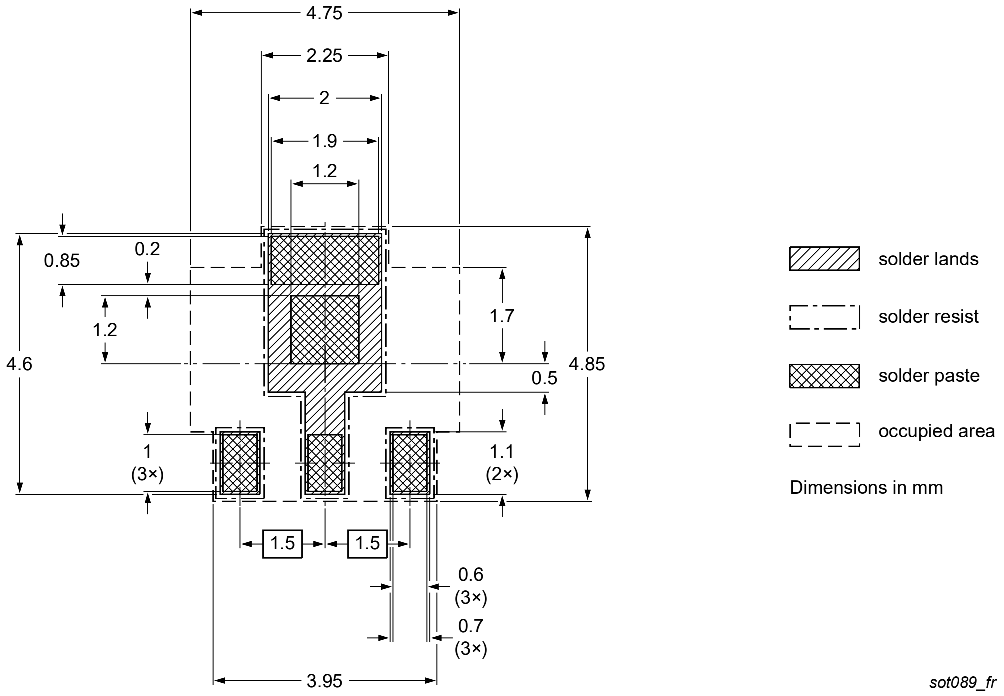


Fig. 13. Reflow soldering footprint for SOT89

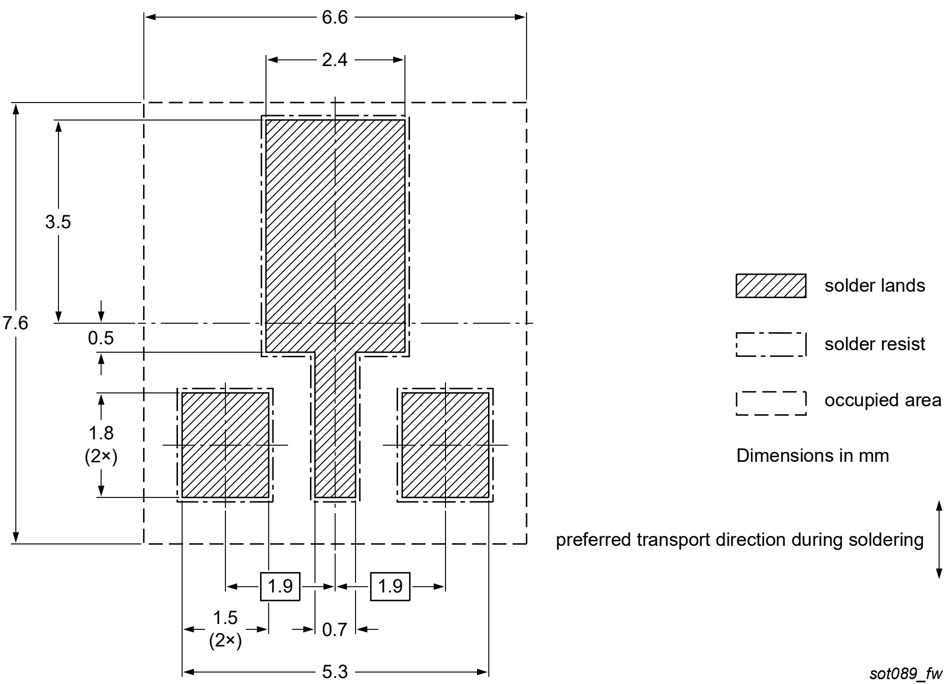


Fig. 14. Wave soldering footprint for SOT89

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV8550X v.4	20241009	Product data sheet	-	PBHV8550X v.2
Modifications:	• Figure 1: graph exchanged			
PBHV8550X v.3	20200608	Product data sheet	-	PBHV8550X v.2
PBHV8550X v.2	20200214	Objective data sheet	-	PBHV8550X v.1
PBHV8550X v.1	20200130	Objective data sheet	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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Date of release: 9 October 2024

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